

What is claimed is:

1. A dilation catheter comprising:
an elongate catheter body with at least one lumen; and
a medical balloon disposed about a portion of the elongate catheter body in fluid communication with the lumen, the medical balloon comprising:
a proximal region and a distal region;
a balloon working length intermediate the proximal region and the distal region;
a proximal taper-to-neck transition and a proximal working length-to-taper transition that define the proximal region;
a distal taper-to-neck-transition and a distal working length-to-taper transition that define the distal region;
wherein at least one transition of the proximal taper-to-neck transition, the proximal working length-to-taper transition, the distal taper-to-neck transition, and the distal working length-to-taper transition comprises a radius greater than 0.127 mm before inflation.
2. The dilation catheter of claim 1, where the radius is from:
0.97 to 3.3 mm when the balloon has a diameter of about 3 mm,
1.8 to 4.7 mm when the balloon has a diameter of about 4 mm,
2.4 to 6.4 mm when the balloon has a diameter of about 5 mm,
3.5 to 8.3 mm when the balloon has a diameter of about 6 mm,
4.8 to 10.2 mm when the balloon has a diameter of about 7 mm,
6.2 to 11.4 mm when the balloon has a diameter of about 8 mm,
6.7 to 13.3 mm when the balloon has a diameter of about 9 mm,
8.1 to 15.2 mm when the balloon has a diameter of about 10 mm,
9.1 to 17.1 mm when the balloon has a diameter of about 11 mm,

9.9 to 19.1 mm when the balloon has a diameter of about 12 mm,

11.2 to 22.9 mm when the balloon has a diameter of about 14 mm, and

13.3 to 25.4 mm when the balloon has a diameter of about 15 mm.

3. The dilation catheter of claim 1, where the radius is from:

1.3 to 3.3 mm when the balloon has a diameter of about 3 mm,

2.5 to 4.7 mm when the balloon has a diameter of about 4 mm,

3.2 to 6.4 mm when the balloon has a diameter of about 5 mm,

4.7 to 8.3 mm when the balloon has a diameter of about 6 mm,

6.4 to 10.2 mm when the balloon has a diameter of about 7 mm,

8.3 to 11.4 mm when the balloon has a diameter of about 8 mm,

8.9 to 13.3 mm when the balloon has a diameter of about 9 mm,

10.8 to 15.2 mm when the balloon has a diameter of about 10 mm,

12.1 to 17.1 mm when the balloon has a diameter of about 11 mm,

13.3 to 19.1 mm when the balloon has a diameter of about 12 mm,

14.9 to 22.9 mm when the balloon has a diameter of about 14 mm, and

17.8 to 25.4 mm when the balloon has a diameter of about 15 mm.

4. The dilation catheter of claim 1, where the radius is:

about 2.5 mm when the balloon has a diameter of about 3 mm,

about 3.2 mm when the balloon has a diameter of about 4 mm,

about 4.7 mm when the balloon has a diameter of about 5 mm,

about 6.4 mm when the balloon has a diameter of about 6 mm,

about 8.3 mm when the balloon has a diameter of about 7 mm,

about 8.9 mm when the balloon has a diameter of about 8 mm,

about 10.8 mm when the balloon has a diameter of about 9 mm,
about 12.1 mm when the balloon has a diameter of about
10 mm,
about 13.3 mm when the balloon has a diameter of about
11 mm,
about 14.9 mm when the balloon has a diameter of about
12 mm,
about 17.8 mm when the balloon has a diameter of about
14 mm, and
about 19.1 mm when the balloon has a diameter of about
15 mm.

5. The dilation catheter of claim 1, where the radius is from about 1.9 mm to about 13 mm.

6. The dilation catheter of claim 1, where the radius is from about 4 mm to about 13 mm.

7. The dilation catheter of claim 1, where the radius is from about 7 mm to about 13 mm.

8. The dilation catheter of claim 1, where the radius is at least 1.9 mm.

9. The dilation catheter of claim 1, where the radius is at least 4 mm.

10. The dilation catheter of claim 1, where the radius is at least 7 mm.

11. The dilation catheter of claim 1, where the proximal taper-to-neck radius is substantially equal to the proximal working length-to-taper radius.

12. The dilation catheter of claim 1, where the distal taper-to-neck radius is substantially equal to the distal working length-to-taper radius.

13. The dilation catheter of claim 1, where the proximal taper-to-neck radius, the proximal working length-to-taper radius, the distal taper-to-neck radius, and the distal working length-to-taper radius are substantially equal.

14. The dilation catheter of claim 1, where the proximal taper-to-neck radius and the proximal working length-to-taper radius are substantially equal to each other, but different from the distal taper-to-neck radius and the distal working length-to-taper radius, which are substantially equal to each other.

15. The dilation catheter of claim 1, where the proximal working length-to-taper radius and the proximal taper-to-neck radius are different.

16. The dilation catheter of claim 1, where the proximal working length-to-taper radius, the proximal taper-to-neck radius, the distal working length-to-taper radius, and the distal taper-to-neck radius are all different.

17. A method of making a dilation catheter, comprising:
fixing a balloon to an elongate catheter body with at least one lumen in fluid communication with the balloon, the balloon being disposed about a portion of the catheter tube, the medical balloon comprising:
a proximal region and a distal region;
a balloon working length intermediate the proximal region and the distal region;
a proximal taper-to-neck transition and a proximal working length-to-taper transition that define the proximal region;
a distal taper-to-neck-transition and a distal working length-to-taper transition that define the distal region;

wherein at least one transition of the proximal taper-to-neck transition, the proximal working length-to-taper transition, the distal taper-to-neck transition, and the distal working length-to-taper transition comprises a radius greater than 0.127 mm before inflation.

18. The method of claim 17, where the radius is from:

0.97 to 3.3 mm when the balloon has a diameter of about 3 mm,

1.8 to 4.7 mm when the balloon has a diameter of about 4 mm,

2.4 to 6.4 mm when the balloon has a diameter of about 5 mm,

3.5 to 8.3 mm when the balloon has a diameter of about 6 mm,

4.8 to 10.2 mm when the balloon has a diameter of about 7 mm,

6.2 to 11.4 mm when the balloon has a diameter of about 8 mm,

6.7 to 13.3 mm when the balloon has a diameter of about 9 mm,

8.1 to 15.2 mm when the balloon has a diameter of about

10 mm,

9.1 to 17.1 mm when the balloon has a diameter of about

11 mm,

9.9 to 19.1 mm when the balloon has a diameter of about

12 mm,

11.2 to 22.9 mm when the balloon has a diameter of about

14 mm, and

13.3 to 25.4 mm when the balloon has a diameter of about

15 mm.

19. The method of claim 17, where the radius is from:

1.3 to 3.3 mm when the balloon has a diameter of about 3 mm,

2.5 to 4.7 mm when the balloon has a diameter of about 4 mm,

3.2 to 6.4 mm when the balloon has a diameter of about 5 mm,

4.7 to 8.3 mm when the balloon has a diameter of about 6 mm,

6.4 to 10.2 mm when the balloon has a diameter of about 7 mm,

8.3 to 11.4 mm when the balloon has a diameter of about 8 mm,

8.9 to 13.3 mm when the balloon has a diameter of about 9 mm,

10.8 to 15.2 mm when the balloon has a diameter of about 10 mm,

12.1 to 17.1 mm when the balloon has a diameter of about 11 mm,

13.3 to 19.1 mm when the balloon has a diameter of about 12 mm,

14.9 to 22.9 mm when the balloon has a diameter of about 14 mm, and

17.8 to 25.4 mm when the balloon has a diameter of about 15 mm.

20. The method of claim 17, where the radius is:

about 2.5 mm when the balloon has a diameter of about 3 mm,

about 3.2 mm when the balloon has a diameter of about 4 mm,

about 4.7 mm when the balloon has a diameter of about 5 mm,

about 6.4 mm when the balloon has a diameter of about 6 mm,

about 8.3 mm when the balloon has a diameter of about 7 mm,

about 8.9 mm when the balloon has a diameter of about 8 mm,

about 10.8 mm when the balloon has a diameter of about 9 mm,

about 12.1 mm when the balloon has a diameter of about

10 mm,

about 13.3 mm when the balloon has a diameter of about 11 mm,

about 14.9 mm when the balloon has a diameter of about 12 mm,

about 17.8 mm when the balloon has a diameter of about 14 mm, and

about 19.1 mm when the balloon has a diameter of about 15 mm.

21. The method of claim 17, where the radius is at least 1.9 mm.

22. A method of reducing the force required to remove a dilation catheter from a conduit, comprising:

(a) inserting the dilation catheter through the conduit, so a medical balloon disposed on the catheter emerges from the conduit, wherein the dilation catheter includes an elongate catheter body, the medical balloon comprising:

a proximal region and a distal region;

a balloon working length intermediate the proximal region and the distal region;

a proximal taper-to-neck transition and a proximal working length-to-taper transition that define the proximal region;

a distal taper-to-neck-transition and a distal working length-to-taper transition that define the distal region;

wherein at least one transition of the proximal taper-to-neck transition, the proximal working length-to-taper transition, the distal taper-to-neck transition, and the distal working length-to-taper transition comprises a radius greater than 0.127 mm before inflation;

(b) inflating the balloon by providing a fluid to a catheter lumen in fluid communication with the balloon;

(c) deflating the balloon; and

(d) applying a force to the dilation catheter, so the balloon is removed from the conduit.

23. The method of claim 22, where the radius is from:

0.97 to 3.3 mm when the balloon has a diameter of about 3 mm,

1.8 to 4.7 mm when the balloon has a diameter of about 4 mm,

2.4 to 6.4 mm when the balloon has a diameter of about 5 mm,

3.5 to 8.3 mm when the balloon has a diameter of about 6 mm,

4.8 to 10.2 mm when the balloon has a diameter of about 7 mm,

6.2 to 11.4 mm when the balloon has a diameter of about 8 mm,

6.7 to 13.3 mm when the balloon has a diameter of about 9 mm,

8.1 to 15.2 mm when the balloon has a diameter of about 10 mm,

9.1 to 17.1 mm when the balloon has a diameter of about 11 mm,

9.9 to 19.1 mm when the balloon has a diameter of about 12 mm,

11.2 to 22.9 mm when the balloon has a diameter of about 14 mm, and

13.3 to 25.4 mm when the balloon has a diameter of about 15 mm.

24. The method of claim 22, where the radius is from:

1.3 to 3.3 mm when the balloon has a diameter of about 3 mm,

2.5 to 4.7 mm when the balloon has a diameter of about 4 mm,

3.2 to 6.4 mm when the balloon has a diameter of about 5 mm,

4.7 to 8.3 mm when the balloon has a diameter of about 6 mm,

6.4 to 10.2 mm when the balloon has a diameter of about 7 mm,

8.3 to 11.4 mm when the balloon has a diameter of about 8 mm,

8.9 to 13.3 mm when the balloon has a diameter of about 9 mm,

10.8 to 15.2 mm when the balloon has a diameter of about 10 mm,

12.1 to 17.1 mm when the balloon has a diameter of about 11 mm,

13.3 to 19.1 mm when the balloon has a diameter of about 12 mm,

14.9 to 22.9 mm when the balloon has a diameter of about 14 mm, and

17.8 to 25.4 mm when the balloon has a diameter of about 15 mm.

25. The method of claim 22, where the radius is:

about 2.5 mm when the balloon has a diameter of about 3 mm,

about 3.2 mm when the balloon has a diameter of about 4 mm,

about 4.7 mm when the balloon has a diameter of about 5 mm,
about 6.4 mm when the balloon has a diameter of about 6 mm,
about 8.3 mm when the balloon has a diameter of about 7 mm,
about 8.9 mm when the balloon has a diameter of about 8 mm,
about 10.8 mm when the balloon has a diameter of about 9 mm,
about 12.1 mm when the balloon has a diameter of about
10 mm,
about 13.3 mm when the balloon has a diameter of about
11 mm,
about 14.9 mm when the balloon has a diameter of about
12 mm,
about 17.8 mm when the balloon has a diameter of about
14 mm, and
about 19.1 mm when the balloon has a diameter of about
15 mm.

26. The method of claim 22, where the radius is at least 1.9 mm.